Applicants : Kyle A. Ray et al.
Appln. No. : 10/798,769
Page : 4

## REMARKS

Claim 15 has been amended, claims 1-14 and 19 have been canceled and claims 15-18, 20 and 21 remain pending in this application.

Claim 15 has been amended to overcome a formal objection. More specifically, basis weights for the nonwoven fabric layers have been provided in all English units (i.e., ounces per square yard), while the original mixed units (i.e., grams per square foot) have been placed in parenthesis. The conversions are based on 1 gram being equivalent to 0.0352739619 ounces, and 9 square feet being equivalent to 1 square yard. Accordingly, it is respectfully submitted that the amendment to claim 15 overcomes the formal objection without introducing new matter or changing the scope of the claim.

The claims are directed to a lightweight thermoformable material that exhibits excellent acoustic barrier/absorption properties. Surprisingly, it has been discovered that an impermeable film disposed between a nonwoven barrier layer and a nonwoven absorber layer provides an excellent sound damping property in a lightweight thermoformable composite. This combination has not been previously known or suggested. To the contrary, as stated in paragraph 21 of the specification, it was previously believed that permeable polymer films and scrims were useful to impart improved sound absorption properties and to shift the frequency at which peak absorption occurs, i.e., tune the barrier for a particular application. It was previously believed that the polymer film or scrim must be permeable in order to achieve the desired sound barrier/absorption properties. The use of an impermeable film between fibrous layers in accordance with the invention has the advantage of providing a lower cost thermoformable sheet material having excellent acoustic barrier/absorption properties as compared with known thermoformable acoustic sheet materials having a permeable scrim or perforated polymer film layer.

Claim Objections

Claim 15 is objected to because of the use of metric and U.S. units of measurement. This objection has been overcome by the above amendment to claim 15.

Applicants : Kyle A. Ray et al.
Appln. No. : 10/798,769
Page : 5

Claim Rejection Under 35 U.S.C. §103

Claims 15-18, 20 and 21 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Copperwheat (U.S. Patent No. 6,008,149) in view of Ramesh et al.(US 2003/0219582).

The Copperwheat patent discloses a recyclable, moldable or thermoformable nonwoven fibrous composite article comprising a variable compression fabric layer and a formable fabric layer. The formable fabric layer exhibits a high degree of strength and stiffness after molding. The variable compression fabric layer is capable of assuming variable thickness and density after molding. Together, the variable compression fabric layer and the formable fabric layer provide a composite that can be molded into a variable thickness article exhibiting a high degree of thickness and strength. Copperwheat discloses that the composite article may be used to manufacture automobile headliners, trunk liners, passenger compartment components, luggage, furniture, sporting goods, and filtration products. In accordance with one embodiment, Copperwheat's moldable composite article utilizes adhesive layers (14, 11) that "are interposed between variable compression fabric layer (2) and formable fabric layers (5) and (8) . . .." Details regarding the adhesive layers are not disclosed. There is no teaching or suggestion that the adhesive layer is impermeable. Neither Copperwheat nor any other prior art of record teach the concept of using an impermeable film between two nonwoven fabric layers of a thermoformable composite for bonding the layers together or for any other purpose. In accordance with other embodiments disclosed by Copperwheat, bonding between the variable compression fabric layer and the formable fabric layer is achieved by softening and/or melting of binder fibers in each of the layers and intermingling under heat and/or pressure, and subsequent cooling and hardening; or by purely mechanical means, such as needle punching.

The Ramesh et al. patent discloses flooring underlayment that functions as a combined sound and moisture vapor barrier. The underlayment is a composite (i.e., a multilayered material) employed to provide resilient support to the overlying flooring material (i.e., carpeting, hardwood floor boards or the like), to smooth over small bumps or other irregularities in the surface of a subfloor, to provide a moisture barrier between the subfloor and finish flooring material, and/or to reduce transmission of sound through the floor. The disclosed underlayment comprises a polymer foam layer for providing resilience and shock absorption, and a sound and moisture vapor barrier layer joined to one side of the polymer

foam layer. The barrier layer is a film formed of a composition comprising a thermoplastic polymer resin and about 10% to 65% by weight filler. Disclosed examples of fillers include barium sulfate, calcium carbonate and barite. The barrier layer preferably includes a lip, and preferably includes an adhesive applied to the lip for adhering the lip to another piece of the sheet material. The two layers are joined together with an adhesive or tie layer 20. There is no suggestion for utilizing the sound and moisture vapor barrier layer in any application other than between a subfloor and finish flooring material. In particular, there is no suggestion for using the moisture vapor barrier layer, either alone or joined to the polymer foam layer, with one or more nonwoven layers of a thermoformable composite material.

Applicants' invention is not merely directed to adhesively bonded nonwoven layers as disclosed in Copperwheat or the use of a polymer film between a subflooring and a finish flooring material as disclosed by Ramesh et al. It is instead directed to a thermoformable acoustic sheet material comprising, in combination, a barrier layer, an absorber layer, and an impermeable polymer film disposed between the barrier layer and the absorber layer. While the prior art discloses the individual components, it does not suggest the claimed thermoformable composite having an impermeable polymer film layer disposed between a barrier layer and an absorber layer.

The adhesive layers of Copperwheat are not described as impermeable films, and the use of an adhesive layer does not suggest an impermeable film. The adhesive layers of Copperwheat could be applied by spraying a liquid adhesive on adjacent faces of one or both of the variable compression fabric layer and the formable fabric layer. This would not provide a continuous impermeable film.

While the Ramesh et al. reference discloses an impermeable polymer film, there is no suggestion that it could be used in the Copperwheat composite. There is not any suggestion that the Ramesh film layer could serve as the adhesive layer in Copperwheat, nor is there any other disclosed reason for disposing the Ramesh film layer between a nonwoven barrier layer and a nonwoven absorber layer. There is simply no motivation for using the impermeable film of Ramesh et al. between the nonwoven layers disclosed by Copperwheat.

The Examiner has suggested that those having ordinary skill in the art would have been motivated to dispose the impermeable film of Ramesh et al. between the nonwoven layers of

Copperwheat so as to utilize the impermeable layer of Ramesh et al. "as an adhesive layer . . ." Such motivation is not provided by the prior art. To the contrary, Ramesh et al. suggests that the impermeable film does not have adhesive properties, but instead requires additional adhesive materials, such as a pressure sensitive adhesive, in order to facilitate bonding of the film to another piece of the sheet material (paragraph 9) and for joining the impermeable film layer to a flexible foam layer (paragraph 25). Thus, one having ordinary skill in the art would not be motivated to use the non-adhesive impermeable polymer film of Ramesh et al. "as an adhesive layer."

The Examiner has also stated that one having ordinary skill in the art would have been motivated to utilize the Ramesh et al. impermeable film between the nonwoven layers of Copperwheat because it "would be highly advantageous to an article for use in automobiles as vehicles are often exposed to the elements." None of the prior art of record teaches or suggests that it is desirable to incorporate a vapor barrier between nonwoven layers of a thermoformable material. In particular, neither Copperwheat nor Ramesh et al. teach or suggest that a moisture vapor barrier is desirable as part of a thermoformable composite article or that such film should be disposed between layers of the article.

It is respectfully submitted that the Examiner's belief that rain and snow can fall onto the headliners of vehicles, particularly jeeps and convertibles, is not irrelevant to whether one having ordinary skill in the art would be motivated to utilize the vapor barrier of Ramesh between nonwoven layers of the moldable composite article of Copperwheat. Obviousness is determined based on what the prior art references fairly teach and suggest. The motivation for combining the teachings of two or more references must be in the prior art. None of the prior art of record teaches or suggests that an impermeable moisture barrier should be disposed between nonwoven layers of a thermoformable noncomposite article for the purpose of preventing damage to an automobile headliner from rain or snow falling upwardly toward the roof of a vehicle. It does not make sense that those having ordinary skill in the art would be motivated to add a vapor barrier to an automobile headliner to prevent damage from rain or snow falling upwardly onto a headliner.

Finally, the Examiner has added that Ramesh et al. provides motivation for adding the vapor barrier film layer to the Copperwheat moldable composite article because "Ramesh et al.

Applicants : Kyle A. Ray et al.
Appln. No. : 10/798,769
Page : 8

teach that the use of the resin film provides the article with dramatically improved sound transmission loss [0032]." Although Ramesh et al. suggest adding a filled resin film to a foam layer to improve sound transmission loss of a floor structure, this does not suggest adding a filled resin film to the moldable composite article of Copperwheat. To do so would be contrary to the stated objectives of Copperwheat, which include providing "an improved moldable fibrous composite made from compatible materials which can be easily recycled." Those having ordinary skill in the art would not regard a calcium carbonate, barium sulfate and/or barite filled polymer film to be compatible with, and readily recycled with, the polymeric nonwoven layers comprising the Copperwheat article. There is no reason to believe that the disclosed filled resin film will perform any useful function when employed as part of a moldable composite article of Copperwheat. Further, a filled film would undesirably add weight to the Copperwheat composite, and a non-filled film would not be expected to provide sound attenuation. There is no suggestion or motivation in the prior art for disposing the impermeable film layer of Ramesh et al. between the nonwoven layers of Copperwheat.

The rejection is based on a hindsight analysis in which the individual components of a claimed combination have been pieced together from Applicants' own disclosure without any genuine motivation from the prior art. A fair reading of the prior art does not provide any suggestion for adding the impermeable film layer of Ramesh et al. between the nonwoven layers of the moldable composite article of Copperwheat.

CONCLUSION

For the reasons stated above, it is respectfully submitted that the application is allowable and notice of the same is earnestly solicited.

Respectfully submitted,

June 1, 2006
Date

Gunther J. Evanina, Registration No. 35 502
Price, Heneveld, Cooper, DeWitt & Litton, LLP
695 Kenmoor, S.E.
Post Office Box 2567
Grand Rapids, Michigan 49501
(616) 949-9610

GJE/dac